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ABSTRACT

This bulletin presents data from a survey covering research and development (R&D) expenditures of state government agencies (exclusive of state universities and colleges) for 1973. Charts showing expenditures, by source of funds of selected years and share of character-of-work components in state agency R&D activities, are shown in the report. Tables showing state agency expenditures for R&D, by state and functional area for fiscal year 1973 as well as for other selected years, are shown; tables also present R&D expenditures by field of science. The states that account for a major share of total state agency R&D and R&D plant expenditures include Illinois, Florida, Texas, Washington, Pennsylvania, Virginia, Michigan and Ohio. The survey also included data on the scientific manpower engaged in the intramural performance of state agency R&D efforts.

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SCIENCE RESOURCES STUDIES

HIGHLIGHTS

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State Agency R&D Activities Almost Quadrupled From FY 1964 to FY 1973

A total of \$242 million in fiscal year 1972 and \$273 million in fiscal year 1973 was expended by State government agencies for research, development, and R&D plant, according to a recently completed NSF survey. The Federal Government provided approximately 50 percent of these funds in 1972 and 1973, and the State governments provided about 48 percent in both years, with the balance provided by nongovernment sources.

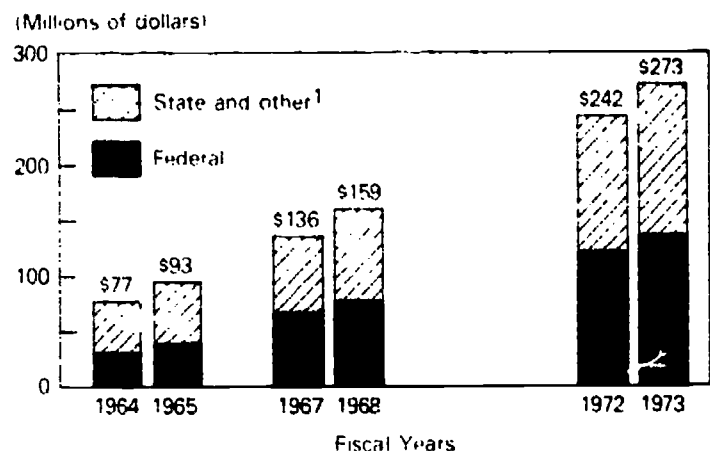
The expenditures reported in 1973 represent an almost fourfold increase over the \$77 million reported in 1964, and even in constant dollars, the rise is almost threefold. In the midsixties the Federal Government contributed less proportionately to the State R&D expenditures than later on when Federal matching grant programs reached their peak. (See chart 1.)

In 1973, nearly nine-tenths of Federal support for State R&D programs was provided by six agencies: The Office of Education of the Department of Health, Education, and Welfare (HEW), 23 percent; the National Institutes of Health (HEW), 16 percent; the Federal Highway Administration of the Department of Transportation, 14 percent; the Bureau of Sport Fisheries and Wildlife of the Department of the Interior, 12 percent; the National Institute of Mental Health (HEW), 11 percent; and the Social and Rehabilitation Service (HEW), 10 percent.

Support by Functions

Throughout the 1964-73 period, more than one-half of total State government agency R&D funds was expended in two functional areas—health and natural resources (table 1). In 1973 R&D programs related to health accounted for 35

Chart 1. State Government agency R&D and R&D plant expenditures, by source of funds: selected years



¹ Other includes about 2 percent of the total each year, and is received from nongovernment sources.

SOURCE: National Science Foundation

percent of the total for all States, compared with 37 percent in 1964. The natural resources share during the same period dropped from 30 percent of the total to 22 percent. The transportation and communications share also dropped substantially, from 18 percent in 1964 to 12 percent in 1973. On the other hand, support for R&D programs related to education rose from 2 percent of the State R&D total to 15 percent. Environment increased from 1 percent to 5 percent, and income security and social services from 5 percent to 8 percent. Whatever may have been occurring relatively, funding in all of these functional areas rose substantially in absolute terms between 1964 and 1973.

Five functions—crime prevention and control, economic growth and productivity, area and community development and housing, science and technology, and energy development and conversion—together accounted for 4 percent of all State agency R&D expenditures in 1973, compared with 7 percent in 1964.

Total R&D expenditure in the United States amounted to \$30.6 billion in 1973. Of that total, \$1.8 billion represented expenditures for research and development by State universities and colleges, exclusive of the \$273 million expended for research and development and R&D plant by State government agencies. Thus, expenditures at the State level represented approximately 7 percent of national R&D expenditures.

The present survey is the third covering R&D expenditures of State government agencies (exclusive of State universities and colleges). The earlier NSF surveys covered fiscal years 1964, 1965, 1967, and 1968.

Table 1 State agency expenditures for research and development,¹ by State and functional area: fiscal year 1973

State	Basic research	Applied research	Development	Other research	Health, population, and environment	Engineering	Space	Other	Economic growth & productivity	All other
Alabama	\$1,100	\$1,100	\$1,100	\$1,100	\$1,100	\$1,100	\$1,100	\$1,100	\$1,100	\$1,100
Alaska	100	100	100	100	100	100	100	100	100	100
Arizona	100	100	100	100	100	100	100	100	100	100
Arkansas	100	100	100	100	100	100	100	100	100	100
California	100	100	100	100	100	100	100	100	100	100
Colorado	100	100	100	100	100	100	100	100	100	100
Connecticut	100	100	100	100	100	100	100	100	100	100
Delaware	100	100	100	100	100	100	100	100	100	100
Florida	100	100	100	100	100	100	100	100	100	100
Georgia	100	100	100	100	100	100	100	100	100	100
Hawaii	100	100	100	100	100	100	100	100	100	100
Idaho	100	100	100	100	100	100	100	100	100	100
Illinois	100	100	100	100	100	100	100	100	100	100
Indiana	100	100	100	100	100	100	100	100	100	100
Iowa	100	100	100	100	100	100	100	100	100	100
Kansas	100	100	100	100	100	100	100	100	100	100
Kentucky	100	100	100	100	100	100	100	100	100	100
Louisiana	100	100	100	100	100	100	100	100	100	100
Maine	100	100	100	100	100	100	100	100	100	100
Maryland	100	100	100	100	100	100	100	100	100	100
Massachusetts	100	100	100	100	100	100	100	100	100	100
Michigan	100	100	100	100	100	100	100	100	100	100
Minnesota	100	100	100	100	100	100	100	100	100	100
Mississippi	100	100	100	100	100	100	100	100	100	100
Missouri	100	100	100	100	100	100	100	100	100	100
Montana	100	100	100	100	100	100	100	100	100	100
Nebraska	100	100	100	100	100	100	100	100	100	100
Nevada	100	100	100	100	100	100	100	100	100	100
New Hampshire	100	100	100	100	100	100	100	100	100	100
New Jersey	100	100	100	100	100	100	100	100	100	100
New Mexico	100	100	100	100	100	100	100	100	100	100
New York	100	100	100	100	100	100	100	100	100	100
North Carolina	100	100	100	100	100	100	100	100	100	100
North Dakota	100	100	100	100	100	100	100	100	100	100
Ohio	100	100	100	100	100	100	100	100	100	100
Oklahoma	100	100	100	100	100	100	100	100	100	100
Oregon	100	100	100	100	100	100	100	100	100	100
Pennsylvania	100	100	100	100	100	100	100	100	100	100
Rhode Island	100	100	100	100	100	100	100	100	100	100
South Carolina	100	100	100	100	100	100	100	100	100	100
South Dakota	100	100	100	100	100	100	100	100	100	100
Tennessee	100	100	100	100	100	100	100	100	100	100
Texas	100	100	100	100	100	100	100	100	100	100
Utah	100	100	100	100	100	100	100	100	100	100
Vermont	100	100	100	100	100	100	100	100	100	100
Virginia	100	100	100	100	100	100	100	100	100	100
Washington	100	100	100	100	100	100	100	100	100	100
West Virginia	100	100	100	100	100	100	100	100	100	100
Wisconsin	100	100	100	100	100	100	100	100	100	100
Wyoming	100	100	100	100	100	100	100	100	100	100

¹ Data on State agency expenditures for research and development are reported in the Survey of State Agency Expenditures for Research and Development.

Leading States

A few States account for a major share of total State agency R&D and R&D plant expenditures, and two States, New York and California, accounted for more than one-third of the total in 1973 (New York, 24 percent and California, 13 percent). Together the 10 largest States (in terms of R&D expenditures) accounted for two-thirds of the total in 1973. Besides New York and California these States, in descending order of dollar support, are Illinois, Florida, Texas, Washington, Pennsylvania, Virginia, Michigan and Ohio. Most of these States are characterized by concentrations of population, considerable Federal agency program activity, and government interest in the utilization of science resources.

Fields of Science

In 1973 the life sciences (biological and clinical medical) accounted for 46 percent of total State R&D expenditures, compared to 59 percent in 1964 (table 2). Engineering also reflected a decreased share of the R&D total over the 9-year period—from 19 percent to 12 percent. Conversely, the social sciences increased from 13 percent to 26 percent, psychology from 4 percent to 7 percent, and environmental sciences from 3 percent to 5 percent. All fields show absolute dollar increases, but the declining share of the life sciences reflects the increase of other functional areas relative to health and natural resources. The increasing share of the social sciences is related to the growth of education R&D programs.

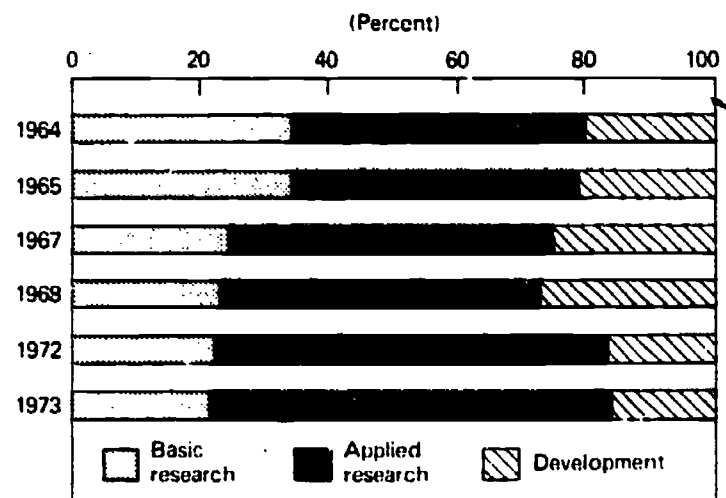
Table 2 State agency R&D expenditures by field of science—selected years

	(Dollars in millions)					
Type of expenditure	1964	1965	1967	1968	1972	1973
Total R&D	\$12,352	\$14,136	\$16,749	\$16,111	\$24,294	\$26,778
Research						
Development	2,002	2,786	3,137	3,424	4,493	4,628
Basic research	4,355	4,351	4,392	3,592	5,260	5,766
Applied research	2,438	4,363	4,568	3,623	14,724	16,345
Development	13,295	14,411	14,617	12,489	39,798	42,176
R&D plant	5,350	5,370	5,111	4,390	7,176	9,595

Source: National Science Foundation.

problem-oriented approach of most State agencies, whose R&D programs are related to their operational missions, e.g., health, recreation, highways, natural resources, etc. The share of the State agency R&D total directed to basic research has dropped considerably over the 9-year period—from 35 percent in 1964 to 22 percent in 1973. The development share has fluctuated between a high of 27 percent in 1968 to a low of 16 percent in 1973.

Chart 2. Share of character-of-work components in State agency R&D activities



SOURCE: National Science Foundation.

Character of Work

Throughout the 9-year period major emphasis has been placed on applied research. (See chart 2 and table 3.) The applied share of the R&D total has risen from 46 percent in 1964 to 62 percent in 1973. This emphasis reflects the

Performers

The State government agencies continue to perform the largest share of their work themselves, approximately two-thirds of the total in 1973, or \$175 million. The remainder has been contracted out to other performers such as private industry, universities, multigovernmental agencies (interstate or regional authorities), and nonprofit institutions.

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Manpower

The survey also developed data on the scientific manpower engaged in the intramural performance of State agency R&D efforts (Table 4). A full-time equivalent of 4 899 scientists and engineers, 3 093 technicians and 3 307 other personnel—such as typists and administrative personnel—were involved in the R&D work performed intramurally in 1973. While their numbers have increased steadily over the years, the R&D-performing personnel have increased less rapidly than intramural R&D expenditures. The cost per scientist-engineer in 1964 was \$21,000 compared with almost \$36,000 in 1973. This rise in part reflects inflation and in part the growing complexity of R&D programs.

* * * * *

Further details from the State government agencies survey will be published in the *Research and Development in State*

Table 4. Personnel engaged in State agency intramural R&D activities by type selected years

	1964	1965	1966	1967	1968	1969
Scientists and engineers	4,899	5,100	5,200	5,300	5,400	5,500
Technicians	3,093	3,100	3,110	3,120	3,130	3,140
Other personnel	3,307	3,310	3,320	3,330	3,340	3,350

Full-time equivalent.
 * Data reported by State agency R&D programs.
 Note: Numbers may not add to total because of rounding.
 Source: National Science Foundation.

Government Agencies, Fiscal Years 1972 and 1973, available later this year from the Superintendent of Documents, U.S. Government Printing Office.

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